

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Mostafazadeh et al.

Attorney Docket No.: NSC1P226R

Patent No.: 6,034,423

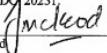
Issued: March 7, 2000

Title: LEAD FRAME DESIGN FOR
INCREASED CHIP PINOUT

CERTIFICATE OF EXPRESS MAILING

I hereby certify that this paper and the documents and/or fees referred to as attached therein are being deposited with the United States Postal Service on December 10, 2001 in an envelope as "Express Mail Post Office to Addressee" service under 37 CFR §1.10, Mailing Label Number ET582483385US, addressed to the Commissioner for Patents, Washington, DC 20231.

Jeena McLeod



PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Prior to an examination on the merits, please enter the following amendments:

10016750-121001

In the Claims:

Please SUBSTITUTE the following amended claim for the pending claim with the same number (a marked up copy of the prior pending claim with all changes shown is supplied in the appendix):

10. In an integrated circuit (IC) package for accommodating an IC chip, wherein said IC chip includes a plurality of I/O pads for signal communications and a portion of said plurality of said I/O pads require a common signal, a method comprising the steps of:

providing a lead frame having (a) a die attach platform; and (b) a plurality of leads, each lead having a circular portion formed as an attachment pad;

providing a substrate having first and second surfaces on opposite sides of said substrate to provide rigid support to said lead frame, said substrate having vias of non-circular cross sections to allow electrical connections between said first and second surfaces;

attaching said lead frame to said first surface of said substrate;

attaching said IC chip to said die attach platform;

electrically connecting said I/O pads to said bus bar and said attachment pads;

providing a solder mask on said second surface of said substrate, said solder masks having openings corresponding to said vias; and

attaching solder balls to said solder mask and providing a flow of solder into said opening and said vias, said solder reaching said attachment pads so that an electrical connection is made between each solder ball and an I/O pad of said I/C chip.

Please ADD the following claims:

11. An integrated circuit package comprising:

a lead frame including a die attach platform, a plurality of contacts that are spaced apart from the die attach platform and a bus bar that is positioned between the die attach platform and at least some of the contacts, wherein bottom surfaces of the die attach platform, the contacts and the bus bar are substantially co-planar;

a die carried by the die attach platform and electrically connected to the bus bar and at least some of the contacts; and

a protective casing covering the die and the lead frame while leaving bottom surfaces of the die attach platform, the bus bar and the conductive contacts exposed, wherein encapsulation material that forms the protective casing is exposed at a bottom surface of the lead frame to physically isolate the bus bar from at least some of the conductive contacts.

12. An integrated circuit package as recited in claim 11 wherein the bus bar is a first bus bar, the integrated circuit further comprising a second bus bar that is also positioned between the die attach platform and some of the contacts.

13. An integrated circuit package as recited in claim 12 wherein the first and second bus bars are located on opposite sides of the die attach platform.

14. An integrated circuit package as recited in claim 11 further comprising bonding wires for electrically connecting the die to the bus bar and the contacts.

15. An electronic module comprising:
an integrated circuit package as recite in claim 11 wherein ground pads on the die are electrically connected to the die attach platform; and
a printed circuit board, wherein the die attach platform is directly electrically connected to a ground on the printed circuit board.
16. An electronic module as recited in claim 15 wherein the die attach platform is directly electrically connected to the ground on the printed circuit board by soldering.
17. An electronic module comprising:
an integrated circuit package as recite in claim 11; and
a printed circuit board, wherein the bus bar is directly electrically connected to the printed circuit board.
18. An electronic module as recited in claim 17 wherein the bus bar is a first bus bar, the integrated circuit further comprising a second bus bar that is also positioned between the die attach platform and some of the contacts and wherein both the first and second bus bars are directly electrically connected to the printed circuit board.
19. An electronic module comprising an integrated circuit package and a printed circuit board, the printed circuit board having a ground, wherein the integrated circuit package comprises:

a lead frame including a die attach platform and a plurality of contacts, wherein bottom surfaces of the die attach platform and the contacts are substantially co-planar, the die attach platform being directly electrically connected to the ground on the printed circuit board;

a die carried by the die attach platform, the die having a plurality of signal pads that are electrically connected at least some of the contacts, and at least one ground pad that is electrically connected to the die attach platform; and

a protective casing covering the die and the lead frame while leaving bottom surfaces of the die attach platform and the conductive contacts exposed, wherein encapsulation material that forms the protective casing is exposed at a bottom surface of the lead frame to physically isolate the die attach platform from at least some of the conductive contacts.

20. A module as recited in claim 19 wherein the die attach platform is directly electrically connected to the ground on the printed circuit board by soldering.

21. A module as recited in claim 19 wherein the lead frame further includes a bus bar positioned between the die attach platform and at least some of the contacts, and wherein the bus bar is directly electrically connected to the printed circuit board.

22. A module as recited in claim 19 wherein the lead frame further includes a plurality of bus bars positioned between the die attach platform and at least some of the contacts, and wherein each bus bars directly electrically connected to the printed circuit board.

REMARKS

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
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APPENDIX

10. In an integrated circuit (IC) package for accommodating an IC chip, wherein said IC chip includes a plurality of I/O pads for signal communications and a portion of said plurality of said I/O pads require a common signal, a method comprising the steps of:

providing a lead frame having (a) a die attach platform; and (b) a plurality of leads, each lead having a circular portion formed as an attachment pad;

providing a substrate having first and second surfaces on opposite sides of said substrate to provide rigid support to said lead frame, said substrate having vias of non-circular cross sections to allow electrical connections between said first and second surfaces;

attaching said lead frame to said first surface of said substrate;

attaching said IC chip to said die attach platform;

electrically connecting said [said] I/O pads to said bus bar and said attachment pads;

providing a solder mask on said second surface of said substrate, said solder masks having openings corresponding to said vias; and

attaching solder balls to said solder mask and providing a flow of solder into said opening and said vias, said solder reaching said attachment pads so that an electrical connection is made between each solder ball and an I/O pad of said I/C chip.